

electric currents in the hands of Ampere and his successors; no mention need be made of the æther until electric radiation begins to play a sensible part, either in the establishment of the field or in the draining off of its energy, or until motion of the electric charges is contemplated. In the latter case, it would appear that we have either to take the æther to be at rest or to say with our author that it behaves as if it were so.

The analogy has here been drawn (which Mr. Macdonald doubtless would not allow) between the analysis of the interactions of electric currents in an æther which is intangible and that of vortical smoke-rings in an atmosphere which is invisible. In each case, one would try to avoid assuming unnecessary properties of the medium. And it is only fair to admit that the properties of electric currents have actually been discovered in this way, while without discussing the fluid we should hardly have made much progress with the more fugitive vortexes.

The process of arriving at wider and wider points of view by successive stages of generalisation from an initial hypothesis is a familiar and fruitful one in theoretical physics; though in these latter times the logical and philosophical merits of the converse process of discarding from our knowledge all colorable images or analogies, in favour of bare mathematical expression of the relations of the unknown quantities which are symbols for entities on which we do not wish to dogmatise at all—of which we, in fact, know intrinsically no more than we do about the most common objects around us—has also been amply enforced. Yet in successful instances of this latter procedure, the retort seems open that the hypothesis or analogy has not been dispensed with until it has effectively disclosed of what type the said relations were to be. It very likely arises from want of familiarity with Mr. Macdonald's point of view that a doubt suggests itself as to whether we have not here a case, if not of kicking away the ladder before the passenger has arrived at the top, at any rate of removing the supporting framework before the ties and struts of the permanent structure have become entirely consolidated.

Much in these remarks has assumed a critical form, because after pointing out the excellences that can be enjoyed by consulting the work itself, it would appear that a reviewer could do best service by discussing the matters that are not so clear. Other more detailed topics might be specified which require further consideration. For instance, students of the modern subject of the relation of radiation to temperature would perhaps be puzzled by § 82, which professes to give a new proof of the Stefan-Boltzmann law; the transformation of linear scale of the system æther *plus* matter, there employed, is a very tempting one, but, unfortunately, the free periods do not seem to correspond. It may be put forward as a reasonable generalisation, subject to only a few striking exceptions, that a book which can be acclaimed as free of discrepancies or obscurities is also to a large extent free of new contributions to knowledge. In the present case, the obvious advances are so important that close attention to the work throughout its whole range cannot safely be neglected.

J. LARMOR.

A STUDY IN ALPINE GEOLOGY.

Das Sonnwendgebirge im Unterinntal. Ein Typus Alpen Gebirgsbaues. By Dr Franz Wähner. First part. Pp. xii + 350; with 96 illustrations in the text, 19 plates and map. (Leipzig and Vienna: F. Deuticke, 1903.) Price 35 marks.

OF all the labour that has been expended on the fascinating problems of Alpine geology, none, perhaps, has been more fortunate in the manner of its presentation than the work under consideration. A lucid style, fine large type and a wealth of illustration contribute to the enjoyment of an interesting thesis. The weight and bulk of the volume, however, constitute a drawback.

The limited area dealt with by the author comprises the Haiderjoch, Rosan and the Sonnwendjoch; and the formations range from the Triassic Werfen beds to the Upper Jurassic Aptychenkalk; but it is with the rocks about the middle of this series that he is mainly concerned. These are classified in the following, descending, order:—Hornsteinkalk (upper Jura), Hornstein-Breccie, Radiolariengesteine, Rother Lias-kalk [Weisser Riffkalk, Ober-rhätischer Mergelkalk, Weisser Riffkalk (lower part)], Kössen beds.

It will be recognised at once that this is an abbreviation of Pilcher's sequence. The main mass of the Weisser Riffkalk, which has all the characters of a true coral reef, has presented a difficulty to the author from the fact that he has found, in the lower parts, undoubted Rhætic fossils, and in other parts, which he considers are higher portions of the same group, Lias fossils have been discovered.

"We are so accustomed to regard the term 'Oberer Dachsteinkalk' as applied to a Rhætic rock that it does not seem wise to use it for a group which is in part Rhætic, in part Liassic."

He therefore proposes "Weisser Riffkalk" as a local term, suggestive of the salient character of the group.

Before presenting the results of his own researches, Dr. Wähner devotes the first 78 pages to the discussion of the geological literature of the Sonnwend district. Commencing with Uttinger in 1819, he passes in review practically all that has been written on the subject up to 1900 (in the preface he comments on Ampferrer's paper of 1902). On each paper he makes a few brief explanatory or critical remarks. To Dr. Diener, however, he allots some fifteen pages, occupied almost wholly in destructive criticism—"a heap of errors," he says in one place; and he is so irritated by what he regards as Diener's incorrect observations and loose writing that he waxes ironical: "I regret I cannot give any figure of this interesting spot," says Diener, which causes the author to remark,

"The reader endeavours to keep calm; perhaps D. had no time to make a sketch—but, on second thoughts, a better view is, that what Diener desires (*will*) to see, nobody *can* draw" (p. 40).

With much of the painstaking work of Pilcher, the author is in agreement, but he considers the

estimate of the number and thickness of the Lias and Jura deposits to be too great. In spite of Pilcher's care in selecting a traverse apparently free from complications, Wöhner contends that thrusting and over-folding have produced a repetition of the beds.

In the chapter on stratigraphy, each member is dealt with in order. Incidentally, several points of interest are raised, such as the discovery in the Weisser Riffkalk of a true Coralline, to which the name *Cheilosporites Tirolensis* (Wöhner) is assigned on account of its affinities with the modern *Cheilosporum*; there is also a doubtful Hydrozoan which more nearly resembles the Palæozoic Stromatoporoids than the Upper Jurassic Ellipsachinias and Sphæractinias, but is none the less morphologically nearest to the Triassic Spongiomorphidæ. Calcareous algæ, hydrozoa and corals contribute to the up-building of the reefs, but Dr. Wöhner finds the last-named organisms predominating.

The greatest interest attaches to the "Radiolariengesteine" and the "Hornstein-Breccie." Dr. Wöhner, in common with his predecessors, had been accustomed to regard the structure of this area as being far simpler than he now finds it. He demonstrates a large amount of thrusting and folding ("Aufwölbung"), the greater part of the movement having acted about the Hornstein-Breccie, the rocks above being comparatively little influenced. On all sides there are signs of pressure—brecciation, suture structure—and the term "Druckbreccien" is suggested as an expansion of Brögger's "Breccias in situ" for this widespread occurrence. The Hornstein-Breccie is proved to be a true "dislocation-breccia," and to contain blocks both of older and younger rocks.

In his anxiety to leave no doubt as to the tectonic origin of this breccia, the author appears to have somewhat laboured certain points that seemed to tell in his favour; for instance, he insists on the abyssal character of the over- and under-lying rocks because of the abundance of Radiolaria in them, especially the occurrence of a few Nassellarian forms—an argument that is not very safe, nor, in view of the other good evidence, is it very necessary. Again, the statement that the cloudy centres of some calcite crystals in the more or less marmorised limestones represent the finest powder of the crushed rock may be quite correct; but the same thing may be observed in semi-crystalline limestones of various ages, which have suffered no such considerable crushing, though it is true that the crystals more often exclude the impurities during their growth.

The author and his supporters, the *Gesellschaft z. Förderung deutscher Wissenschaft, Kunst, u. Literatur in Böhmen*, may be congratulated on the production of an excellent piece of work. The continuation will be looked for with interest; it is to be hoped that Dr. Wöhner, in addition to the half-promised geological map, will also furnish a series of photomicrographs of the numerous rock-sections he has examined.

J. A. H.

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SHERBORN'S INDEX ANIMALIUM.

Index Animalium sive Index nominum quæ ab A.D. MDCLVIII generibus et speciebus animalium imposita sunt, Societatibus Eruditorum adjuvantibus, a Carolo Davies Sherborn confectus. Sectio prima, a kalendis Januariis MDCLVIII usque ad finem Decembris MDCCC, Cantabrigiæ. E. typographico Academico MDCCCIII. 1 vol. Pp. lix + 1195. (Cambridge: University Press, 1902.) Price 25s. net.

DARWIN was so convinced of the pressing want of a dictionary of the names of plants that he devoted by his will a considerable sum of money to be employed in compiling such a work. This gigantic task, which was completed in 1895 by Mr. B. Daydon Jackson, and published by the University of Oxford under the title of "Index Kewensis," has been of enormous utility to working botanists. It was obvious that our zoologists would not be content without a similar convenience in their branch of natural science, and in 1890, accordingly, Mr. C. Davies Sherborn commenced his labours on the present work. His scheme for its preparation was set out in a letter published in this journal (*NATURE*, vol. xlii. p. 54, May 15, 1890) and in "La Feuille des Jeunes Naturalistes," and suggestions for the improvement of the plan were at the same time invited from many working naturalists. After these had been studied, the scope of the proposed "Index Animalium" was finally defined as follows:—

(1) To provide a complete list of all the generic and specific names that have been applied to animals since January 1, 1758, when Linnæus inaugurated the binomial system.

(2) To give, as far as possible, an exact date for every quotation of a name.

(3) To give a reference to every name sufficiently exact to be intelligible to the specialist and the layman, so that they may know where to look for it.

Mr. Sherborn commenced regular work on July 1, 1890. After two years, an unfortunate breakdown in health, which interrupted more than once his assiduous labours, caused him to lose altogether three years, so that the actual time spent on the preparation of the present volume has been about eight years.

In 1892, the importance of the work was brought to the knowledge of the British Association, and a committee was appointed to assist its progress. The late Sir William Flower was its chairman, and Dr. Sclater, Dr. Henry Woodward and Mr. W. L. Sclater were other members. The committee has been reappointed every year, Dr. Woodward succeeding Sir W. Flower as chairman, and Dr. F. A. Bather becoming secretary when Mr. W. L. Sclater went abroad. The British Association has consistently supported the finances of the committee, and valuable contributions have been received from the Zoological Society of London and from the Government-grant fund of the Royal Society. Great assistance to the work has also been furnished by the permission of the authorities of the Natural History Museum to find storage and cabinets for the MS. of the work in the library at South Kensington, where the author has carried on most of his labours.

In 1897, in pursuance of a suggestion made by Dr.